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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/595,690

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Hans J. Hug

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EXAMINER

LARKIN, DANIEL SEAN

ART UNIT

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/595,690	<b>Applicant(s)</b> HUG ET AL.	
	<b>Examiner</b> DANIEL S. LARKIN	<b>Art Unit</b> 2856	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 06 August 2010.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 10-27 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 16 and 22-25 is/are allowed.
- 6) ☒ Claim(s) 10-15, 17-21, 26 and 27 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |   |   |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                    | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)         | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claim 26 is rejected under 35 U.S.C. 102(b) as being anticipated by US 5,717,132 (Watanabe et al.).

Watanabe et al. disclose a cantilever assembly (Figure 10), comprising: a cantilever (CA1) having a cantilever tip (3P), the cantilever having a back side (top of cantilever) and a front side (bottom side, tip side) opposite the back side and the cantilever being operably mounted to a rigid support (19) on the back side, wherein the cantilever comprises a step-like portion on its front side near where the cantilever is attached to the support, the step-like portion substantially increasing a thickness of the cantilever.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

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invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 10-13, 17, and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 5,245,863 (Kajimura et al.) in view of "Small Cantilevers for Force Spectroscopy of Single Molecules" (Viani et al.).

With respect to the limitations of claims 10-13 and 21, Kajimura et al. disclose an atomic force microscope and method of manufacturing one, comprising: a cantilever assembly for scanning a sample (12), comprised of: a cantilever (16) having a cantilever tip (14), the cantilever being mounted to a rigid support (17) and being provided with an area (18) of high reflectance material on the back side of the cantilever. The area (18) appears to have a boundary sloping towards the support (17) which fulfills the condition the area of the high reflectance material divided by the area of the sloping boundary area is greater than one, see Figure 1. The area of high reflectance is created by a source containing material having a high reflectance. Kajimura et al. fail to disclose a cantilever or an area of high reflectance material of the size claimed.

Viani et al. disclose a process whereby small rectangular cantilevers are fabricated from silicon nitride. Viani et al. disclose that the cantilevers fabricated have a length of 9-50 micrometers and metallic reflector pads have been added to the cantilever ends to maximize reflectivity. Although the article to Viani et al. fails to expressly disclose the size of the reflector pad, the examiner argues that with a cantilever having a length of nine micrometers, naturally, the reflector pad would have an area of reflectance less than ten micrometers. Providing a "small" cantilever would

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have been obvious to one of ordinary skill in the art because it is well known in the art that small cantilevers have higher resonant frequencies than larger cantilevers, while simultaneously providing the same spring constants.

With respect to the limitation of claim 17, Kajimura et al. appear to shown, Figure 1, that the portion of the support (17) to which the cantilever (16) is attached has a recessed shaped which narrows in a direction towards the cantilever.

Claim 14, 15 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 5,245,863 (Kajimura et al.) in view of "Small Cantilevers for Force Spectroscopy of Single Molecules" (Viani et al.) as applied to claim 10 above, and further in view of US 5,319,961 (Matsuyama et al.).

With respect to the limitations of claims 14, 15, and 20, the combination of Kajimura et al. in view of Viani et al. disclose all of the limitations of the base claim, but fail to disclose that the support provided with a sharp edge that is located a distance from a back side of the cantilever tip, the distance being determined such that during application of the reflectance material the area on the back side of the cantilever tip and the sloping boundary are formed on a support having at least two steps and wherein the edge of the second step does not obstruct application of the high reflectance material.

Matsuyama et al. disclose a cantilever chip for use in scanning probe microscopes, comprising: a cantilever (16) attached to a substrate (12). In one embodiment, as shown in Figure 2J, the substrate (12) is provided with a sharp edge having at least two steps that is located a distance from a back side of the cantilever tip.

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The arrangement of the support would appear to allow formation of a reflectance material on the back side of the cantilever above the cantilever tip. Providing a substrate having a sharp edge would have been obvious to one of ordinary skill in the art as a means of properly adhering the cantilever to the support.

Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over US 5,245,863 (Kajimura et al.) in view of "Small Cantilevers for Force Spectroscopy of Single Molecules" (Viani et al.) as applied to claim 10 above, and further in view of US 5,753,912 (Matsuyama).

With respect to the limitation of claim 18, the combination of Kajimura et al. in view of Viani et al. disclose all of the limitations of the base claim, but fail to disclose that the recessed part of the support is partly-octagonal.

Matsuyama discloses a cantilever chip comprising a support section (4) for supporting a cantilever (6). The support section has a recessed portion (16) narrowing in the direction towards the cantilever. Additionally, in an alternative embodiment, Figure 3D, the recessed portion of the support body is shaped as an irregular hexagon, which is deemed to represent Applicants claimed partly-octagonal shape, given that Applicants' disclosed shaped has is also an irregular hexagon. Providing a hexagonal face of a cantilever support would have been obvious to one of ordinary skill in the art because Matsuyama teach use of a hexagonal support having all the same advantages of a conventionally shaped cantilever support.

Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over US 5,245,863 (Kajimura et al.) in view of "Small Cantilevers for Force Spectroscopy of Single Molecules" (Viani et al.) as applied to claim 10 above, and further in view of US 6,365,895 (Yamamoto).

With respect to the limitations of claim 19, Kajimura et al. in view of Viani et al. disclose all of the limitations of the base claim, but fail to disclose that the cantilever comprises a step-like portion which is arranged near the end of the cantilever which is attached to the support, the step-like portion substantially increasing a thickness of the cantilever on a front side of the cantilever. Kajimura et al. appears to show a thickening of the cantilever on the back side of the cantilever near the end of the cantilever which is attached to the support.

Yamamoto discloses an apparatus for measuring a micro surface configuration utilizing a cantilevered probe (1). The probe is formed of a single material and comprises a pointed tip section (1a), a beam portion (1b), and a proximal portion (1c) that is mounted to a support table (4). As shown in the figures, the proximal portion (1c) of the cantilevered probe (1) has a thickness that is substantially greater than the thickness of the beam portion (1b). Providing a cantilevered probe with a proximal portion having a substantially greater thickness than a beam portion would have been obvious to one of ordinary skill in the art as a means of making the attachment of the probe to the support structure easier.

Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over US 5,245,863 (Kajimura et al.) in view of "Small Cantilevers for Force Spectroscopy of Single Molecules" (Viani et al.) as applied to claim 10 above, and further in view of US 5,717,132 (Watanabe et al.).

With respect to the limitations of claim 19, Kajimura et al. in view of Viani et al. disclose all of the limitations of the base claim, but fail to disclose that the cantilever comprises a step-like portion which is arranged near the end of the cantilever which is attached to the support, the step-like portion substantially increasing a thickness of the cantilever on a front side of the cantilever. Kajimura et al. appears to show a thickening of the cantilever on the back side of the cantilever near the end of the cantilever which is attached to the support.

Watanabe et al. disclose a cantilever assembly (Figure 10), comprising: a cantilever (CA1) having a cantilever tip (3P), the cantilever having a back side (top of cantilever) and a front side (bottom side, tip side) opposite the back side and the cantilever being operably mounted to a rigid support (19) on the back side, wherein the cantilever comprises a step-like portion on its front side near where the cantilever is attached to the support, the step-like portion substantially increasing a thickness of the cantilever. Providing a cantilevered probe with a proximal portion having a substantially greater thickness than a beam portion would have been obvious to one of ordinary skill in the art as a means of making the attachment of the probe to the support structure easier.



Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over US 5,717,132 (Watanabe et al.) in view of US 5,245,863 (Kajimura et al.)

Watanabe et al. disclose all of the limitations of the base claim including an embodiment, as discussed with reference to Figures 56 and 57, whereby cantilever flexure is measured using the optical lever method. A piece of aluminum thin film is placed on the back side of the cantilever facing away from the sample. Watanabe et al.

Kajimura et al. disclose an area (18) of high reflectance material on the back side of the cantilever facing away from a sample. The area (18) also appears to have a boundary sloping towards the support (17). Modifying the thin aluminum film to have a sloping boundary would have been well within the purview of one of ordinary skill in the art.

### ***Response to Arguments***

Applicant's arguments filed 06 August 2010 have been fully considered but they are not persuasive.

With respect to Applicant's argument that Watanabe et al. fail to disclose a rigid support, the examiner respectfully disagrees. The support prior to the hinge 19a is a rigid structure. Applicant's use of the term "comprising" does not expressly exclude use of a hinge after the rigid support or anywhere else within the support.

With respect to Applicant's argument that the movable arm is not part of Watanabe et al.'s cantilever assembly, the examiner respectfully disagrees. An apparatus claim is defined by its structure and not by its intended use. The claim as it

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relates to the cantilever and support interaction simply requires the cantilever being mounted to a rigid support on the back side of the cantilever. Reference to Watanabe et al. shows a cantilever having a back side with a rigid support (19, 20) mounted to the back side of the cantilever. The claim as currently presented does not preclude intermediary structure between the cantilever and support.

With respect to Applicant's argument that Kajimura et al. cannot be readily combined with Viani et al., the examiner respectfully disagrees. First, it is unclear as to what Applicant is referring to when using the terms "back side" and "front side". Each of these orientations have to have the frame of reference also mentioned. Is Applicant referring to "front side" and "back side" of the cantilever with respect to the sample surface or the cantilever support structure. For instance, it appears that Applicants are asserting that Viani et al has their reflective pad provided on the front side facing towards the sample; however, the examiner wonders how this cantilever can detect surface topography if the reflector pad is facing the surface. First, how would the reflector pad interact with the sample surface to cause the cantilever to deflect? Second, none of the pictures within Viani et al. show the reflector pad and the cantilever tip on the same side of the cantilever. Figure 2a shows a top view of the cantilever with the reflector pads and the cantilever tip missing from view. Figure 2b shows a perspective view of the cantilevers without the pads. Thus it would appear that the reflector pad do not face the sample as alleged by Applicant and further the examiner is not aware of any cantilevers that have this supposed arrangement. In either case, the references to Kitamura et al. and Viani et al. both disclose application of a reflection pad

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on the cantilever which is on the opposite side of the cantilever from the attachment of the cantilever tip.

With respect to Applicant's argument that examiner's reason for combining references does not address problems noted in the prior art, the examiner respectfully disagrees. The combination of the Kitamura et al. in view of Viani et al. is evidence that claim 10 is obvious. That particular combination may have solved many different problems (both recognized, as is yours; and those that were not recognized), but the reality is that the combination is obvious for the reasons stated. The examiner is of the impression that Applicant asserts that he has solved the problem of Viani's reflective surface of the cantilever of Figure 1 not being able to meet the condition of  $C/\Delta C$  being greater or equal to 1 due to alignment problems deficiencies, which alignment deficiency has been *somehow* addressed by Applicant. The alleged problem amounts to a secondary consideration, which is permissible to overcome an obvious type rejection. However, the simple reality is that the combination of Kitamura et al. in view of Viani et al. clearly meets the claim. It was noted that the disclosure does not clearly explain the particulars as to how the alignment of smaller dimensions is overcome in the invention, and that Applicant's claims are merely directed to the end result. The combination of Kitamura et al. in view of Viani et al. teaches that same claimed end result.

With respect to Applicant's argument that Matsuyama et al. fails to disclose an area of high reflectance on the cantilever, the examiner respectfully agrees.

Matsuyama et al was provided to show that a small cantilever (i.e. less than 100

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micrometers) can be provided with support structure having two steps on a cantilever side opposite the cantilever tip. The use of a reflective area on a “back side” (opposite cantilever tip) of a cantilever has been shown in the Kitamura et al. reference. Use of a reflective area on the cantilever disclosed in Matsuyama et al. would have been obvious to one of ordinary skill in the art because Matsuyama et al. expressly disclose that optically measuring displacement of the cantilever is well known in the prior art. Interestingly, Matsuyama et al. has chosen to only mention optical detection instead of the multitude of other well known detection mechanisms, such as piezoelectric, piezoresistive, magnetic, or capacitive to name but a few, which would leads one of ordinary skill in the art to believe that that cantilever used in Matsuyama et al. is to be used in an optical detection scheme; and as such, the reflective material would have to be placed on the cantilever side attached to the support opposite the tip side of the cantilever.

### ***Allowable Subject Matter***

Claims 16 and 22-25 are allowed.

### ***Conclusion***

This is a continuation of Applicant's earlier Application No. 10/595,690. All claims are drawn to the same invention claimed in the earlier application and could have been finally rejected on the grounds and art of record in the next Office action if they had been entered in the earlier application. Accordingly, **THIS ACTION IS MADE**

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**FINAL** even though it is a first action in this case. See MPEP § 706.07(b). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no, however, event will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to **DANIEL S. LARKIN** whose telephone number is (571)272-2198. The examiner can normally be reached on 8:30 AM - 5:00 PM Mon-Fri.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hezron Williams can be reached on 571-272-2208. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Daniel S. Larkin/  
Primary Examiner, Art Unit 2856